

TRANSLATION OF JAPANESE UNEXAMINED PATENT APPLICATION NO. 2000-266

(19) JAPANESE PATENT OFFICE (JP)

(12) Official Gazette for Unexamined Patent Applications (A)

(11) Japanese Unexamined Patent Application (Kokai) No. 2000-266 (P2000-266A)

(43) Disclosure Date: 7 January 2000 (2000.1.7)

Classification Theme code (for reference)

(51) Int. Cl.⁷: Symbols: FI

A 61 F 13/15 A 41 B 13/02 A 3B029

5/44 A 61 F 5/44 H 4C098

A 41 B 13/02 S

Request for Examination: Not yet submitted

Number of Claims: 4

OL (Total of 7 pages [in the original])

(21) Patent Application No.: Heisei 10-168435

(22) Filing Date: 16 June 1998 (1998.6.16)

(71) Applicant: 000122298
Oji Paper Co., Ltd.,
4-7-5, Ginza,
Chuo-ku, Tokyo

(72) Inventor: Masaru Tsubata
c/o Oji Paper Co., Ltd.
Higashigumo Research Center,
1-10-6, Higashigumo,
Edo-ku, Tokyo

F Terms (For reference) 3B029 BF00 BF02 BF05
4C098 AA09 CC10 CC27 CC39 CE05

(54) [Title of the Invention] Method of printing on an absorptive worn article, and absorptive worn article on which the printing has been administered

(57) [Abstract]

[Problem] To administer a design pattern, of an arbitrary shape and in an arbitrary position, that is recognizable from the outer side of an absorptive worn article.

[Solving Means] During the manufacture of an absorptive worn article which comprises a liquid permeable top sheet, liquid impermeable back sheet and an absorptive material arranged between these two sheets, the administering of a printing pattern, by ink-jet printing, that is recognizable from the outside when the article is worn. Furthermore, the implementation of said ink-jet printing in an assembly step in which the assembly is carried out as the constituent materials of the absorptive worn article are unwound.

[Claims]

[Claim 1] Method of printing on an absorptive worn article that comprises a liquid permeable top sheet, liquid impermeable back sheet and an absorptive body arranged between these two sheets, and in which the administered printing pattern is recognizable from the exterior when the article is worn,

which method of printing on an absorptive worn article is characterized in that said printing pattern is administered on predetermined members of said absorptive worn article by ink-jet printing.

[Claim 2] Method of printing on an absorptive worn article according to Claim 1, characterized in that the outer layer sheet of the abovementioned absorptive worn article comprises one or more layers of a non-woven cloth or the like arranged on the outer side of the back sheet, and the printing pattern recognizable from the exterior when the

article is worn is administered on said back sheet, and at least one surface of the front and rear surfaces of said outer layer sheet, by ink-jet printing.

[Claim 3] Method of printing on an absorptive worn article according to Claim 1 or Claim 2, characterized in that the abovementioned ink-jet printing is administered on predetermined members in an assembly step in which the assembly is carried out as the members from which the abovementioned absorptive worn article is configured are continuously unwound.

[Claim 4] In an absorptive worn article comprising a liquid permeable top sheet, liquid impermeable back sheet and an absorptive body arranged between these two sheets,

an absorptive worn article on which printing has been administered, characterized in that a printing pattern recognizable from the exterior is administered, by ink-jet printing, on at least one surface of a member arranged in a position of the absorptive worn article that is recognizable from the exterior when the article is worn.

[Detailed Description of the Invention]

[0001]

[Field of Industrial Utilization] The present invention relates to a method of printing in which, in the manufacturing step of an absorptive worn article, a printing pattern is administered on an absorptive worn article member, and to the absorptive worn article on which the printing has been administered by said printing method.

[0002]

[Prior Art] Various modes of absorptive worn articles have been designed in the prior art, for example, those which comprise a liquid permeable top sheet, liquid impermeable back sheet and an absorptive body arranged between these two sheets which, by virtue of the liquid impermeable back sheet and the absorptive body which for the most part retains the excretions such as urine which are excreted through the liquid permeable top sheet when the article is worn, are employed to prevent leakage of excretions to the outside of the absorptive worn

article, and which in accordance with need, are provided with expanding elastic members and fixing clasps in such a way that they can be used as disposable absorptive worn articles, or are formed as an underpants-type in advance.

[0003] Examples of the above-described designed and widely employed absorptive worn articles include disposable diapers for infants, and disposable diapers for the incontinent aged or persons requiring nursing.

[0004] In addition to the action by which the original excretions are retained in the article itself, these absorptive worn articles are provided with a means for fixing the article to be worn on the wearer, a means for enclosing the excretions within the article to prevent an unpleasant sensation being imparted to the wearer, and a means to prevent the excretions from leaking to the outside of the article and, although these articles are configured so that the action of these means is effective, in a case where, for example, the infant is able to put on the abovementioned absorptive worn article formed as an underpants-type by themselves, or a case where it is necessary for a nurse to put the article to be worn on an adult, a means must be provided by which distinction between front and back and top and bottom of the worn article is easy.

[0005] In addition, combining those cases in which there is a need to employ different sizes in accordance with the body type of the wearer with, in particular, those which consider disposable pants for infants, the provision in these absorptive worn articles of design patterns that children like, as well as the display of sizes that are identifiable at a glance, is a necessary function in terms of consideration to pleasure and convenience during use.

[0006] For this reason, in the prior art, product brand names and product size and, in the case of infants, design patterns enjoyed by infants such as cars and animals, have been printed in advance on the fixing clasps and the liquid impermeable back sheets of the article so as to be recognizable from the outer side of the absorptive worn article and, in addition, with the objective of distinction between front and

back, the arrangement of design patterns in specific positions such as the back sheet has been widely employed.

[0007] However, the printing of design patterns and so on has been performed in a step prior to the assembly step of the absorptive worn article by the printing of a design pattern in advance on the individual materials, such as the fixing clasps and back sheets, from which the absorptive worn article is configured, and the printing means for these materials has generally been performed by the administering of flexographic printing and rotogravure printing.

[0008]

[Problems to be Solved by the Invention] As the hitherto performed flexographic printing and rotogravure printing has been performed on the material of the members from which the absorptive worn article is configured using a photoengraved printing roller, the product cannot help but be one in which a restricted number of types of design pattern are formed continuously at constant interval. That is to say, as there are limits to the outer diameter dimensions of the printing roller, the number of types of design pattern that can be continuously printed on the material of a predetermined member is limited to, at most, 4 or 5 types, and this restricts the number of types of absorptive worn article with printing pattern that can be included in one packaged unit for shipment. In addition, during the manufacturing assembly of the absorptive worn article (in the assembly step), because the material of each member from which the absorptive worn article is configured is normally unwound continuously and supplied from a supply device and, after an adhesive assembly step, the article is cut into predetermined lengths and manufactured, it is difficult to arrange the printing pattern in a predetermined position of these members in the finished article. Moreover, where product-size characters are to be scribed on the materials, even if it were supposed that the width of the materials were the same, the materials cannot be used for articles of different size so, when a size alteration or the like is implemented during manufacture (changeover to manufacture of an article of different dimensions), an inconvenience is generated and the manufacturing cannot be efficiently performed.

[0009] The objectives of the present invention, which is designed to solve the above-described problems, are not only to be able, for example, in the manufacture of the absorptive worn articles, to increase the number of types of printing pattern administered on the absorptive worn article, to afford printing in predetermined positions of the absorptive worn article easily, to afford the printing of identification symbols (patterns) that have not been printed in the prior art, and furthermore, to be able to implement changes in the printing pattern easily accompanying alterations in size and product type during manufacture and to increase the degree of visual satisfaction and convenience to the wearer during use, but also to improve production efficiency. The present inventors discovered that, in the manufacture of the absorptive worn article, they could administer a design pattern by ink-jet printing that was recognizable from the outer surface during wearing, and this led to the completion of the present invention.

[0010]

[Means to Solve the Problems] The first invention of the present invention is a method of printing on an absorptive worn article that comprises a liquid permeable top sheet, liquid impermeable back sheet and an absorptive body arranged between these two sheets, and in which the administered printing pattern is recognizable from the exterior when the article is worn, which method of printing on an absorptive worn article is characterized in that said printing pattern is administered on predetermined members of said absorptive worn article by ink-jet printing. It will be noted that the phrase "printing pattern" used in the present invention refers to a whole range of printed details such as characters, symbols, and design patterns.

[0011] The second invention of the present invention is the method of printing on an absorptive worn article according to Claim 1, characterized in that the outer layer sheet of the abovementioned absorptive worn article comprises one or more layers of a non-woven cloth or the like arranged on the outer side of the back sheet, and the printing pattern recognizable from the exterior when the article is worn is administered on said back sheet and at least one surface of

the front and rear surfaces of said outer layer sheet by ink-jet printing. In other words, the printing patterns may be printed on the back sheet material, or they may be printed on at least one of either the front or rear surfaces of the outer layer sheet material comprising one or more layers. In addition, in each case where printing is performed on two surfaces or more, the respective printing patterns can be distinguished by the adoption of a semitransparent element as the outer layer sheet, and separate printing patterns can be printed on each surface and the respective printing patterns overlapped to form one design. In addition, by the printing on the inner side to the outer surface of the outermost layer sheet, the outer layer sheet acts as protection for the printed surface.

[0012] The third invention of the present invention is a method of printing on an absorptive worn article according to Claim 1 or Claim 2, characterized in that the abovementioned ink-jet printing is administered on predetermined members in an assembly step in which the assembly is carried out as the members from which the abovementioned absorptive worn article is configured are continuously unwound. By virtue of the fact that the printing is administered in the assembly step, printing can be performed in an arbitrary position of the member.

[0013] The fourth invention of the present invention is, in an absorptive worn article comprising a liquid permeable top sheet, liquid impermeable back sheet and an absorptive body arranged between these two sheets, an absorptive worn article, on which printing has been administered, characterized in that a printing pattern recognizable from the exterior is administered, by ink-jet printing, on at least one surface of a member arranged in a position of the absorptive worn article that is recognizable from the exterior when the article is worn. In other words, the printing pattern is printed on the surface of a member arranged in a position of the absorptive worn article recognizable from the exterior when the article is worn and, in the case where the back sheet is semitransparent and a further semitransparent outer layer sheet is provided on the outer side of the back sheet, the printing may be administered on a plurality of members, or the printing may be administered on both surfaces of the member.

[0014]

[Mode of Embodiment of the Invention] According to the absorptive worn article of the present invention, printing patterns recognizable from the outer surface when the article is worn are administered by ink-jet printing and, because ink-jet printing, unlike the flexographic printing and photogravure printing of the prior art, does not require a photoengraved printing roller, design patterns and so on, in accordance with the tastes of the user, the use of the product, the size of the product and the product brand name, can be printed in, essentially, a limitless number of patterns on the material from which the absorptive article worn is configured, wherein pleasure and convenience during wearing can be increased. In other words, a photoengraved printing roller is used in rotogravure printing and flexographic printing and, because there are limits to the outer diameter dimensions of the printing roller, even if there is a wish to increase the number of types of design pattern, the number of types of design pattern which can be continuously printed in a predetermined material is, at most, 4 or 5, but in ink-jet printing, because the design patterns can be altered in one action, the number of types of design pattern can be markedly increased.

[0015] At this time, if the ink-jet printing is administered on the target material in an assembly step in which the assembly is performed while the materials of the absorptive worn article are unwound (referred to as the assembly step), printing patterns can be easily arranged in predetermined positions in the absorptive worn article and, furthermore, the predetermined positions can be arbitrarily set. Accordingly, the distinction between the front and rear and top and bottom can be made clear when the article is worn, and patterns can be administered where the aim is a fixed position such as the adhesive tabs for fixing the absorptive worn article to the body of the wearer.

[0016] In addition, by virtue of the fact that the ink-jet printing is administered in the assembly step of the materials from which the absorptive worn article is manufactured, the printing heads can be arranged in required positions when the materials for which printing is required are moved and, because printing patterns can be administered in

predetermined positions of the material by printing at required intervals, different to the case of assembly involving the unwinding of materials that have been printed in advance, changes to the printing position and printing pattern are easy, and there are no limits to material application based on the printing pattern that is required.

[0017] Furthermore, multicolor printing is possible by the arrangement of a plurality of printing heads of different ink color along the direction of movement of the material and the printing of printing patterns of different color on the same member, or, by the overlap printing of printing patterns of respectively different colors on separate members. In addition, printing is possible across a broad range by the arrangement of a plurality of printing heads along the vertical direction to the direction of movement of the material.

[0018] The effects of inkjet printing can be more markedly demonstrated because the printing of required design patterns in required positions on non-printed materials is administered in the assembly step of the absorptive worn article in this way, and this is because ink-jet printing has a characteristic whereby, unlike rotogravure printing and flexographic printing, because it does not require a photoengraved printing roller, printing can be implemented easily in the assembly step of the absorptive worn article. In addition, where the objective is simply an increase in the number of types of design pattern, although, like the methods of the prior art, the printing can be administered in advance on the materials using inkjet printing and, in the assembly step, assembly can be performed while adjustments are made so that said printing patterns are arranged in specific positions on the absorptive worn article, the best method for effective implementation of the objectives of the present invention is an online printing method in which printing is administered during the assembly step.

[0019] Next, a description is given below of one example of a specific method for the administering of online ink-jet printing in the manufacturing step of the absorptive worn article in the present invention, and of the manufacture of the absorptive worn article. In the assembly step, components (materials), from which the absorptive worn

article which is rolled in a roll shape is configured, are unwound and, using printing heads arranged on the unwound material, the required printing patterns are administered on those materials which are to be printed such that predetermined printing patterns are arranged in predetermined positions on the completed absorptive worn article. There are times when the printing is administered on a plurality of materials and although, particularly in cases where, for example, an overlapped printing pattern is administered on a plurality of semitransparent materials which are to be printed, the printing patterns must be arranged in mutually predetermined positions at the time of completion, in the printing method of the present invention, because arbitrary printing positions can be set on each of the materials to be printed by the initiation of printing which matches the phase of, for example, a cutter-rotor (cutter-rotor for cutting the absorptive worn article continuum) which forms a reference, the printing positions between each of the materials to be printed can also be easily set.

[0020] Next, other materials such as the absorptive body material, expanding elastic member materials, and fastening materials such as tape are assembled, and the absorptive worn article is obtained as a continuum. Thereafter, following the provision of notch parts to form the end mode, cutting is carried out using the abovementioned cutter in order to form individual articles. Irrespective of the implementation or otherwise of online printing, these steps, which are carried out to match the position in which a normally assembled material is arranged, can be implemented without any particular problem using common techniques.

[0021] The present invention is one in which, in the manufacture of absorptive worn article supplied in a multitude of modes, printing patterns recognizable from the exterior are administered by inkjet printing, and furthermore, because said ink-jet printing is administered in the assembly step, the configuration of the printing material must be, with regard to the material of the absorptive worn article on which the printing is administered, a material in which inkjet printing is possible and in which the printing is recognizable from the exterior. By way of example, where a polyethylene film is employed as the liquid impermeable back sheet in the outer surface, printing can be administered on the

outer surface of the polyethylene film and, where a semitransparent polyethylene film is employed, printing can be administered on the inner surface of the polyethylene film, and furthermore, in this case, where an absorptive material enclosed by way of an absorptive paper is employed, printing which is recognizable from the exterior can be administered on the inner surface or outer surface of the absorptive paper.

[0022] In addition, recognition from the outer surface is possible in the arrangement of a further one or more layer of outer layer sheet on the outer surface of the back sheet. In this case, a semitransparent sheet is employed as the outer layer sheet, and separate designs are printed in mutually different positions on at least the two back sheet and outer layer sheet surfaces so that each design is recognizable from the exterior. A non-woven sheet can be used as the outer layer sheet and, by the employment of a non-woven sheet comprising two layers as the outer layer sheet, the expanding elastic member can be held between the two sheets.

[0023] In other words, in the absorptive worn article of the present invention, provided the printing is recognizable from the exterior of the absorptive worn article, the type of the material that the ink-jet printing is administered on may be selected from either the liquid impermeable back sheet, the absorptive paper enclosing the absorptive material, or the outermost layer sheet and, in addition, printing can be administered on a plurality of materials so as to be recognizable from the exterior of each.

[0024] In addition, in the present invention, using an absorptive worn article in which the back sheet and outermost layer sheet extend from both side end parts of the absorptive material to form side flap parts and in which fixing clasps are arranged on the side flaps, and using an absorptive worn article formed as an underpants-type by the bonding in advance of opposing sides of the garment at the front and rear of the side flap parts formed, expanding elastic members may be arranged in opening parts around both legs and in an opening part around the waist in order to prevent displacement during wear.

[0025] In addition, although there are no particular limitations to the ink employed in the ink-jet printing in the present invention, selection must be made on the basis of the material that constitutes the subject for the printing. Provided they are dispersed in a liquid, pigments or dyes can be used on the non-woven cloths and polyethylene film that are widely employed as the materials for the back sheet and outer layer sheet, and as an ink dispersed in a solvent or in water which forms a solid at normal temperatures, a hot-melt type ink dispersed within wax which forms a liquid when heated can be selected. This wax type is particularly suitable for printing on non-woven cloths.

[0026]

[Embodiment] A detailed description of the present invention is given below with reference to the diagrams that show an embodiment of the present invention. Figure 1 is a perspective view that shows, as an embodiment of the present invention, an absorptive worn article formed in advance as an underpants-type. The absorptive worn article 1 of the present invention shown in Figure 1, which comprises an opening part around the legs 2 and a opening part around the waist 3, and in which a rear body garment 4 and front body garment 5, formed to extend between the left and right abovementioned opening parts around the legs, are adhered and locked by a side seam 6, has an underpants-type shape, and a printing pattern 7, recognizable from the exterior when worn, is administered on the rear body garment 4 side by ink-jet printing.

[0027] Figure 2 is a cross-sectional view that shows a state in which the side seam 6 of the absorbent worn article 1 of the present invention shown in Figure 1 is unfolded and expanded, and is sectioned in the rear body garment 4 in a direction parallel to the opening part around the waist 3. The absorptive worn article 1 comprises a liquid permeable top sheet 8, liquid impermeable back sheet 9, and an absorptive body 10 arranged between these two sheets, wherein the absorptive body 10 is joined to the liquid permeable top sheet 8 by way of an absorptive paper 11, and to the liquid impermeable back sheet 9 by way of an absorptive paper 12, and the printing pattern 7 recognizable from the exterior when worn is administered between the absorptive paper 12 and liquid impermeable back sheet 9 by ink-jet printing. In this case, the liquid

impermeable back sheet 9 is a semitransparent sheet, and ink-jet printing may be either administered on the liquid impermeable back sheet 9 or the absorptive paper 12. In addition, the positions in both surfaces may be shifted to afford the administering of respectively separate printing patterns.

[0028] Figure 3, which shows another embodiment in which a printing pattern recognizable from the exterior when worn is administered by ink-jet printing on the absorptive worn article 1 of the embodiment of the present invention shown in Figure 1 and Figure 2, is a partial cross-sectional view showing a state in which the rear body garment 4 is sectioned in a direction parallel to the opening part around the waist 3.

The absorptive worn article 1 of the present invention shown in Figure 3 comprises a liquid permeable top sheet 8, liquid impermeable back sheet 9, and an absorptive body 10 arranged between these two sheets, wherein the absorptive body 10 is joined to the liquid permeable top sheet 8 by way of an absorptive paper 11, and to the liquid impermeable back sheet 9 by way of an absorptive paper 12, and the printing pattern 7 recognizable from the exterior when worn is administered on the outer surface of the liquid impermeable back sheet 9 by ink-jet printing.

[0029] Figure 4, which shows another embodiment in which a printing pattern recognizable from the exterior when worn is administered by ink-jet printing on the absorptive worn article 1 of the embodiment of the present invention shown in Figure 1 and Figure 2, is a partial cross-sectional view showing a state in which the rear garment 4 is sectioned in a direction parallel to the opening part around the waist 3. The absorptive worn article 1 of the present invention shown in Figure 4 comprises a liquid permeable top sheet 8, liquid impermeable back sheet 9, and an absorptive body 10 arranged between these two sheets, and the absorptive body 10 is joined to the liquid permeable top sheet 8 by way of an absorptive paper 11, and to the liquid impermeable back sheet 9 by way of an absorptive paper 12, and because an outer layer sheet 14 arranged in the outer side and outer layer sheet 13 arranged in the inner side are arranged in this sequence on the outer side of the liquid impermeable back sheet 9, and the printing pattern is administered by ink-jet printing between the outer layer sheet 13 and outer layer sheet

14 and the outer layer sheet 14 is semitransparent, said printing pattern is recognizable from the exterior when worn. The printing pattern may be administered on either side of the outer layer sheet 13 and outer layer sheet 14 and, in addition, the positions in both surfaces may be shifted to afford the administering of respectively separate printing patterns. Furthermore, by the overlapped administering of printing patterns of respectively different colors in the outer layer sheet 13 and outer layer sheet 14 to form one design, multicolored printing designs can be achieved.

[0030] In addition, in the absorptive worn article of Figure 4, only one outer layer sheet is arranged in the outer side of the liquid impermeable back sheet 9, and printing patterns recognizable from the outer surface when worn can be administered between the liquid impermeable back sheet 9 and outer layer sheet by ink-jet printing. In this case, by the adoption of a semitransparent sheet as the outer layer sheet, ink-jet printing may be administered on both the outer layer sheet and liquid impermeable back sheet 9 side. In addition, the positions in both surfaces may be shifted to afford the administering of respectively separate printing patterns and, furthermore, by the overlapped administering of printing patterns of respectively different colors on these respective surfaces, a multicolored printing design can be formed.

[0031] Figure 5 is, in the absorptive worn article of the present invention, a side-surface view that shows the fundamentals of the equipment for performing online ink-jet printing on the absorbent paper, liquid impermeable back sheet and outer layer sheet materials in the assembly step of the absorptive worn article; the printing heads of the ink-jet printer are arranged across a rotating roller for transporting the materials, and a control device generates a printing command signal based on a phase signal (not shown in the diagram) of, for example, a cutter rotor which forms a reference, and a speed signal detected from the number of rotations of the rotating roller, wherein predetermined printing patterns can be imparted to predetermined positions. In addition, drying devices, which are effective in hastening the drying and prevention of soiling by non-dried ink, may be provided at the rear of the printing heads to afford drying.

[0032] Figure 6 is, in the absorptive worn article of the present invention, a plane-surface view that shows the fundamentals of the equipment for performing online ink-jet printing on the absorbent paper, liquid impermeable back sheet and outer layer sheet materials in the assembly step of the absorptive worn article, and although a control device generates a printing command signal based on speed signals and so on detected from the rotating roller and printing patterns are printed in predetermined positions, Figure 6 shows that, in accordance with the

need, the predetermined positions can be arbitrarily altered, and that the predetermined printing patterns can be arbitrarily set and altered. In other words, the printing position, printing pattern, and density can be arbitrarily selected.

[0033] A liquid permeable non-woven cloth comprising synthetic fibers whose raw materials are polyethylene, polypropylene, polyester or other thermoplastic resins can be employed as the liquid permeable top sheet employed in the underpants-type disposable diapers of the present invention. Examples of the liquid impermeable back sheet which can be selected include a liquid impermeable polyethylene sheet, and preferably a polyethylene sheet in which small holes are provided, as well as a moisture permeable liquid impermeable sheet which is stretched by the addition of a filler to a thermoplastic resin, or a lamination of the liquid impermeable sheet and non-woven cloth. In addition, from the objective of the present invention, in order for the printing pattern administered on the inner surface of the back sheet to be recognizable from the outer surface it must possess the appropriate visible light permeability and, although adjustments can be made based on the ratio of filler added to the thermoplastic resin, which constitutes the raw material of the back sheet, when the moisture permeability characteristic is imparted, the concerns regarding steaming disappear and comfort is much improved.

[0034] In addition, the expanding elastic member around the opening part of both legs and the opening part around the waist can use, without alteration, the expanding elastic body normally used in disposable diapers such as polyurethane rubber cord and cord rubber, and these expanding elastic members are, in an expanded state, adhesively-fixed using a hot-melt adhesive to predetermined regions in the opening part around the waist and opening part around the legs respectively.

[0035] It is preferable that the absorbent material employed be one in which a fluff pulp is jointly used with highly absorbent polymer principle material, or besides this, an absorbent paper alone, or a laminate or mixture of, for example, heat-fused fibers. In addition, it is preferable that the whole body be formed in a laminated structure

which is enclosed by an absorbent paper such as tissue, and although the shape of the absorbent body may be rectangular or an hourglass shape, better fitting characteristics are obtained using the hourglass shape.

[0036] Although a non-woven cloth comprising a synthetic fiber whose raw materials are polyethylene, polypropylene, polyester and other thermoplastic resins can be employed as the outermost layer sheet, outer layer sheet and inner layer sheet, from the objective of the present invention, the printing pattern administered on the inner surface of the back sheet must possess an appropriate visible light permeability to be recognizable from the outer surface, and 10 to 30 g/m² as the weight per unit area of the non-woven cloth is suitable.

[0037]

[Effect of the Invention] According to the printing method of the present invention, although printing patterns recognizable from the exterior during wearing of the absorptive worn article are administered by ink-jet printing, because ink-jet printing, unlike the flexography printing and rotogravure printing of the prior art, does not require a photoengraved printing roller, pattern designs and so on, in accordance with the tastes of the wearer, the usage method of the product, the product size and the product brand-name, can be administered arbitrarily in all kinds of patterns on the absorptive worn article members. Accordingly, using the printing method of the present invention, the number of types of design pattern of absorptive worn article in one package unit (packaged bag) for shipment can be increased, a diversification of absorptive worn articles can be obtained, and pleasure to the wearer, based on visual satisfaction and convenience when worn, can be increased.

[0038] In addition, because the printing patterns can be arranged in arbitrary positions of the absorptive worn article by, in the manufacturing step of the absorptive worn article, the administering of ink-jet printing on the target material in the assembly step of the materials, it is easy for, for example, a pattern which affords clarity of distinction between front and back and top and bottom during wearing to be arranged in a specified position, and for a pattern to be

administered on the absorptive worn article which pinpoints a fixed position such as an adhesive tab fixed to the body of the wearer.

[0039] In addition, by the ink-jet printing in the assembly step of the materials in the absorptive worn article, different to a case in which assembly is carried out as the material rolled up in a roll shape after printing is unwound and supplied from a supply device, cases in which size alterations and so on are necessary during assembly are easily dealt with, and there are no limitations to material application based on the required printing pattern.

[0040] Furthermore, by the arrangement of a plurality of printing heads of different ink color in the direction of movement of the material in the assembly step, and the printing of printing patterns of different colors on the same member, or, the overlapped printing of printing patterns of respectively different color on separate members, multicolored printing is possible. In addition, by virtue of the fact that a plurality of printing heads are arranged along the vertical direction to the direction of movement of the materials, a wide range of printing is possible.

[Brief Description of the Diagrams]

[Figure 1] is a perspective view of disposable diapers formed in an underpants-type as the absorptive worn article of the present invention;

[Figure 2] is a side-surface view that shows a state in which the side seam of the absorptive worn article of Figure 1 is unfolded and spread out, and in which sectioning is in the rear body garment;

[Figure 3] is a partial cross-sectional view of a separate embodiment to the absorptive worn article of the present invention shown in Figure 2 showing a state of sectioning in the rear body garment;

[Figure 4] is a partial cross-sectional view of a separate embodiment to the absorptive worn article of the present invention shown in Figure 2 and Figure 3 showing a state of sectioning in the rear body garment;

[Figure 5] is a side-surface view that shows the fundamentals of the equipment for implementing the printing method of the present invention; and

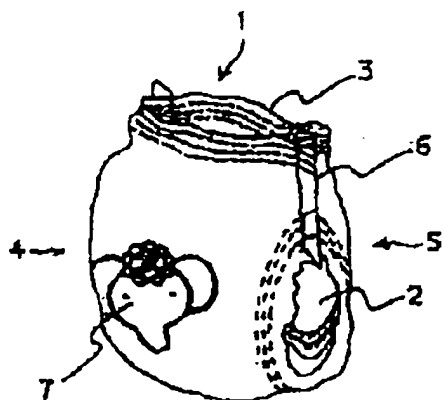
[Figure 6] is a plane surface view that shows the fundamentals of the

equipment for implementing the printing method of the present invention.

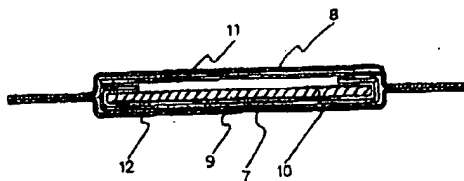
[Explanation of Symbols]

- 1: Underpants-type disposable diapers
- 2: Opening part around legs
- 3: Opening part around waist
- 4: Rear garment
- 5: Front garment
- 6: Side seam
- 7: Printing pattern
- 8: Liquid permeable top sheet
- 9: Liquid impermeable back sheet
- 10: Absorbent body
- 11, 12: Absorbent paper
- 13, 14, 15: Outer layer sheets

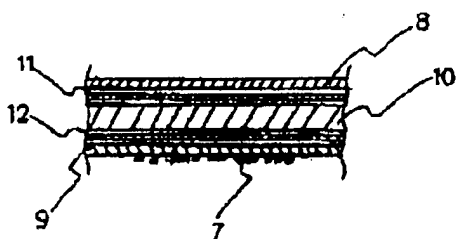
[Fig. 1]



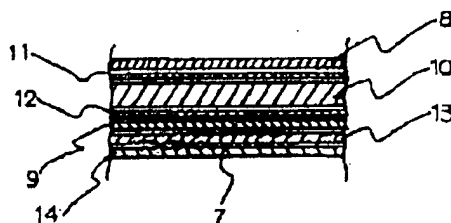
[Fig. 2]



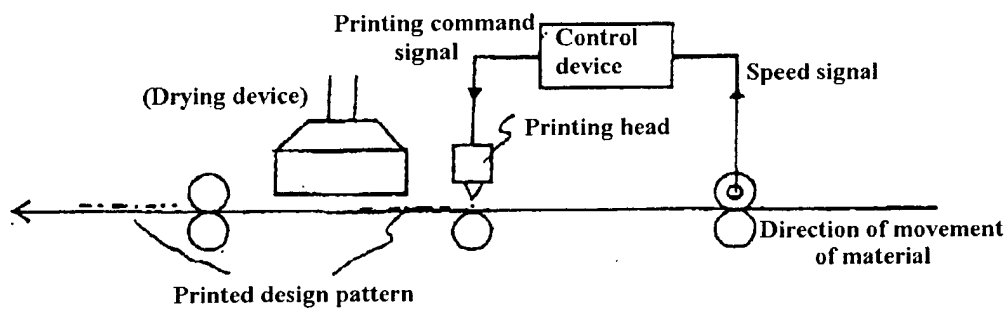
[Fig. 3]



[Fig. 4]



[Fig. 5]



[Fig. 6]

